



PARALAX™

TRANSMITTER DESIGNED FOR REPACK



UHF/VHF

COMARK
Communications

PARALLAX™

SOLID STATE. BROADBAND. AFFORDABLE.

THE FUTURE HAS ARRIVED. With rapid changes in solid state RF device technologies and design techniques, combined with our commitment to improve efficiency, Hitachi-Comark has developed PARALLAX™—the industry's next generation medium and high power liquid cooled, solid state transmitter.

PARALLAX features unique engineering that allows for highest signal quality, reliability, and efficiency while keeping the cost of ownership as low as possible. Most important, PARALLAX offers flexibility: no matter how large or small, each station is assured top-notch performance for its specific needs. PARALLAX is available in either UHF or VHF Band 3.



KEY FEATURES:

- Unique vertical high-gain RF Power Amplifier (PA) ~50lbs
- Broadband UHF Doherty amplifier technology produces ultra-high RF efficiency
- Double-sided liquid cooling plate configuration optimizes RF power density
- Common system elements (cabinet, user interface, etc.) for both UHF and VHF Band 3
- EXACT DTV exciter supports ATSC or DVB-T/T2; can be upgraded with unique "DualCast" design from ATSC 1.0 to ATSC 3.0, preserving investment
- Same PA output power in ATSC 1.0 & ATSC 3.0
- Liquid cooled amplifiers mean high reliability, simple installation, easy maintenance
- Commercial off-the-shelf (COTS) Hot-Swap AC to DC rectifiers provide >96% efficiency
- Industry leading Digital Adaptive Pre-correction (DAP) attains the highest RF signal performance
- Simple, yet powerful, control system is accessed via a large local touch-screen or through built-in Wi-Fi on tablet or phone
- Remote web GUI control/monitoring or SNMP v2 for Network Operations Center maximizes distant management
- Manufactured, serviced, and supported in the U.S.A.



27.5kW 16PA's

STACKED. SMART. VERTICAL.

STACKED POWER/HIGHEST POWER DENSITY

PARALLAX™ has you covered for all medium and high power requirements in both UHF and VHF Band 3. With up to 16 Power Amplifiers (PAs) per transmitter cabinet, PARALLAX delivers an industry best of up to 27.5kW UHF Transmitter Power Output (TPO) in a single rack cabinet. Transmitter power levels can be scaled higher with multiple cabinets operating in parallel for 55, 75, or even 100kW TPO — the highest power solid state transmitter available. For stations with lower power levels, the rack can scale back to as few as 3 x 2kW amplifiers for 5kW TPO in UHF.

SMART POWER SUPPLY DESIGN

PARALLAX uses highly efficient commercial off-the-shelf AC to DC rectifiers in the Power Supply Unit (PSU). These rectifiers are typically used in data centers, servers, telecom and enterprise networks and are proven reliable; they feature programmable output voltage (42-58VDC) to maximize device load and associated efficiency. Each PSU incorporates three (3) hot-swap rectifiers for added redundancy; each PA module is paired with a PSU module (1:1 ratio). The separate PSU and PA configuration reduces PA module weight to approximately 50 lbs., so a single technician can easily service the transmitter. The transmitter supports 208VAC or 480VAC for North America, 380VAC for International applications; there is no need for an external, step down transformer.



Our AC-DC rectifiers are easy to reach

VERTICAL IS BETTER

Hitachi-Comark reviewed various options for the PA's electro-mechanical design and orientation. A vertical PA and PSU orientation was selected for PARALLAX for several reasons:

- Vertical is easier to handle especially in high power transmitters where amplifiers are mounted both above and below a technician's comfortable reach.
- A vertical module allows an engineer to support the assembly weight with one hand while guiding the unit into operation with the other hand.
- A vertical bank of PA/PSU modules permits straightforward orientation of the associated RF combiner.
- Each bank of PA/PSU modules uses a silver plated, air dielectric, strip-line hybrid RF combiner.
- The orientation of this 3-or 4-way combiner syncs with the remainder of the RF plumbing for an efficient, compact RF design that is fully integral to the cabinet, which saves valuable floor and overhead space.



Liquid cooled power amplifier module

PRECISION COOLING. OPTIMIZED DESIGN. USER-FRIENDLY.



Open PARALLAX Transmitter



RF combiner

LIQUID COOLING

High power density dictates precise liquid cooling technology to remove the dissipated heat. Each PARALLAX rack cabinet utilizes a dedicated cooling loop that consists of the coolant tank, multi-fan heat exchanger, and variable-speed circulating pumps that are sized according to transmitter requirements, thus increasing efficiency. Hitachi-Comark's unique stainless steel pipe-in-aluminum cold plate design optimizes PARALLAX for a standard 50/50 water-glycol mixture. The plate does not have direct contact with the coolant solution, eliminating concerns of galvanic corrosion in the amplifier.

OPTIMIZED RF DESIGN

The PARALLAX transmitter incorporates all necessary RF power combiners inside the transmitter cabinet. External RF loads or high power RF combiners are not needed, so installation is simplified. Using a high efficiency, multi-level hybrid system, the RF combiner provides natural isolation of each RF amplifier module; reject loads are liquid cooled and sized to support any modes of emergency operation (with less than full count of amplifiers), ensuring the transmitter stays on-the-air. In addition, multiple reject power level and VSWR sensors throughout the RF system feed key performance metrics back to the transmitter control system. Hitachi-Comark's facility optimizes the entire external RF system including the RF mask filter that is used to meet spectral mask requirements per each customer's specific needs, thus reducing on-site installation time.

UNIQUE USER EXPERIENCE

PARALLAX offers a unique user experience with the streamlined control and monitoring system. Embedded within the transmitter is a field-proven, industrial CAN bus. Each major subassembly within the transmitter incorporates a microcontroller and functions as a "node"—PARALLAX uses separate nodes for each RF amplifier, the cooling system, internal RF system monitoring, the remote I/O (dry loop), and the local emergency transmitter controls. The system also features built-in control redundancy in case of emergency operation, keeping the unit on air.

The master transmitter system controller provides key insight into the overall transmitter: local monitoring, control, and set-up are via a simple web based Graphical User Interface (GUI); the GUI is displayed on the system controller's touch-screen and is available via optional Wi-Fi connection using a smart phone or tablet. An Ethernet connection to the transmitter enables remote web GUI control anywhere in the world. For broadcasters with a Network Operations Center (NOC), remote access can be provided using SNMP v2 and a supplied MIB. For traditional remote control, a dedicated I/O port allows for dry loop connectivity.

HITACHI-COMARK HAS YOU COVERED.



Remotely diagnose

PARALLAX offers broadcasters additional features including an operational and fault logging system. The transmitter log is stored in non-volatile memory so events can be accessed regardless of transmitter operation. The control system also enables Hitachi-Comark's customer service group to remotely diagnose the operation of the transmitter and to perform remote software updates.

PARALLAX™ TYPICAL CONFIGURATIONS

OPERATING FREQUENCY

- UHF: 470- 608 MHz
- VHF: 174-216 MHz
- 6/7/8 MHz RF Channel bandwidth

MODULATION/STANDARD

- ATSC 1.0, 3.0 upgradeable
- DVB-T/H, T2, Lite
- ISDB-T, DAB

PERFORMANCE

- RF Power - see table below
- SNR \geq 32dB typical
- Shoulders > 37dB DVB > 47dB ATSC
- Efficiency up to 42% UHF
up to 50% VHF Band 3
- RF Stability \pm 2%

ELECTRICAL:

- Three Phase AC Mains
- 208 VAC -11% / + 15%
- 380 VAC +/-15%
- 480 VAC -15% / + 8%
- 50/60 Hz
- \geq 0.98 power factor

MONITORING & CONTROL

- Local 15" color touch screen
- Web: Ethernet via RJ-45
- Wi-Fi: Web GUI access
- Remote I/O (dry loop) via DB-37
- SNMP v2

ENVIRONMENTAL AND SAFETY

- 0° to 45° C Temp range
- \leq 90% non-condensing relative humidity
- \leq 3000m Maximum Altitude

MECHANICAL

- Liquid Cooled, external multi-fan heat exchanger
- 50 Ω output impedance
- 4-1/16" EIA RF output
- 80" H x 30" W x 56" D per Equipment Rack Cabinet
- See chart below for configurations

WIDEBAND UHF DOHERTY

| Number of Amplifiers: | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 32 | 48 | 64 |
|-------------------------|----------------------------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| UHF Output* (kW): | | | | | | | | | | | | | | | | |
| Amplifier ATSC | 5.4 | 7.2 | 11.0 | 12.6 | 14.4 | 16.2 | 18.0 | 19.8 | 21.6 | 23.4 | 25.2 | 27.0 | 30.0 | 60.0 | 82.5 | 110.0 |
| TPO ATSC (after filter) | 5.0 | 6.5 | 10.0 | 11.3 | 13.0 | 15.0 | 16.2 | 18.0 | 20.0 | 21.0 | 22.7 | 24.3 | 27.5 | 55.0 | 75.0 | 100.0 |
| Cabinet Configuration: | Single Transmitter Cabinet | | | | | | | | | | | | | 2x | 3x | 4x Cab |

VHF BAND 3 DOHERTY

| Number of Amplifiers: | 3 | 4 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 18 | 24 | 32 |
|-------------------------|----------------------------|-----|-----|------|------|------|------|------|------|------|------|------|------|--------|------|------|
| VHF Output* (kW): | | | | | | | | | | | | | | | | |
| Amplifier ATSC | 4.6 | 6.1 | 9.1 | 10.6 | 12.2 | 13.7 | 15.2 | 16.7 | 18.2 | 19.8 | 21.3 | 22.8 | 24.3 | 27.4 | 36.5 | 48.6 |
| TPO ATSC (after filter) | 4.3 | 5.8 | 8.7 | 10.1 | 11.6 | 13.0 | 14.4 | 15.9 | 17.3 | 18.8 | 20.2 | 21.7 | 23.1 | 26.0 | 34.7 | 46.2 |
| Cabinet Configuration: | Single Transmitter Cabinet | | | | | | | | | | | | | 2x Cab | | |

* Other multi-cabinet configurations available. Consult your factory sales representative. Specifications subject to change without notice



Corporate Office in Southwick, MA

HITACHI-COMARK OVERVIEW

High performance, award-winning **TV transmitters** backed by more than 45 years of leadership in both inductive output tube (IOT) and solid-state broadcast technologies: **Hitachi Kokusai Electric Comark LLC** provides concrete solutions for the demands of today's global TV broadcast industry.



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